



**REENGINEERING AIR MOBILITY: A PROCESS PERSPECTIVE**

GRADUATE RESEARCH PROJECT

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## Table of Contents

Acknowledgements.....	iv
List of Figures.....	vii
Abstract.....	viii
I. Introduction .....	1
What is Reengineering? .....	1
What is Air Mobility? .....	2
Why Should We Reengineer?.....	2
II. Literature Review .....	4
More About Reengineering.....	4
A History of Airlift .....	6
A History of Air Refueling .....	5
The Coming of Age of Air Mobility.....	8
Air Mobility Doctrine Development.....	9
Joint Air Mobility Doctrine .....	11
Air Force Mobility Doctrine .....	13
The Doctrine of Operational Control.....	17
Defense Transportation Regulations.....	22
The Air Mobility Mission .....	24
III. Methodology .....	26
Fundamentals of Business Process Reengineering .....	26
Fundamental Air Mobility Principles .....	27

IV. Analysis .....	31
A Reengineering Disclaimer .....	31
Peacetime Air Mobility .....	32
Air Mobility for the Joint Task Force .....	34
Air Mobility in the Joint Air Operations Center .....	36
V. Conclusions/Recommendations .....	41
Recommendation: Allow AMC to Operate Theater Airlift .....	41
Recommendation: Realign Air Refueling Forces in JAOC .....	42
Recommendation: Reconsider Role of DIRMOBFOR .....	43
Recommendation: Develop Wartime Air Mobility Processes .....	44
The Reengineering Team .....	45
Bibliography .....	48
Vita .....	51

## List of Figures

Figure 1 - C-121 Constellation “Heavy” Airlifter .....	9
Figure 2 - C-54 Skymaster “Medium” Airlifter.....	9
Figure 3 - Chain of Command and Control .....	20
Figure 4 - Routine Command and Control of Mobility Operations.....	33
Figure 5 - Command Relationships for Mobility Forces Attached to a Joint Task Force	35
Figure 6 - The Joint Air Operations Center and Command Relationships for Air Mobility Forces .....	37

## **Abstract**

### Reengineering Air Mobility: A Process Analysis

The nature of any successful business, government, or military, is to be able to deal with change effectively. Change can come about as a result of societal or technological progress, or as an application of past experience. Given that change will, at some point, always be required, the question of how best to accomplish these changes needs to be addressed. Small-scale change is relatively easy to achieve, but change in large degree requires a more radical approach. Business Process Reengineering is a relatively recent and very successful methodology for dealing with large-scale changes. Our nation's military, even though it is considered by most as the best in the world, must continue to change, to transform itself, if it hopes to maintain that advantage. One important and clearly distinctive capability is our burgeoning air mobility fleet of airlift and air refueling aircraft. Changes in technology and lessons learned from recent operations highlight the need for us to review our use of air mobility assets. This research paper will explore various air mobility business processes, identify those becoming obsolete, and recommend possible solutions and updated methodology by incorporating reengineering techniques.



# REENGINEERING AIR MOBILITY: A PROCESS PERSPECTIVE

## I. Introduction

There have always been reasons for changing the ways in which the military fights wars and does its business. Some reasons for changing are because of new technology. Others are as an adaptation to circumstances. Whatever the need, changes are a necessary part of operating in the world today, whether one is operating a company, or the military. However, recognizing the need to change is not sufficient. Random changes, to support some inherent desire to change for its own sake, or to put one's "signature" on an organization, are usually doomed to fail. What is required is a proven method of carefully and thoughtfully changing, not doing so haphazardly. Enter "re-engineering."

What is Reengineering?

Dealing with organizational change is the topic of a groundbreaking book by Hammer and Champy, entitled "Reengineering the Corporation: A Manifesto for Business Revolution." Originally published in 1993, the techniques of their work have been successfully applied to some major corporations, including Duke Power, IBM, and John Deere, and are proven methods for effective change. Complementing the success of commercial industry, the Defense Department has also committed to reengineering by way of its own Business Process Reengineering (BPR) organization. The Chief Information Officer (CIO) of the Defense Department, the Assistant Secretary of Defense for Command, Control, Communications and Information (ASD C3I) has an office dedicated to assembling a core of knowledge about BPR concepts. This paper will use BPR to examine one important sector of the Defense Department: Air Mobility.

## What is Air Mobility?

Air mobility is a relatively new term, coined with the arrival in 1992 of the newly formed Air Mobility Command (AMC). AMC brought with it much of the older Military Airlift Command (MAC), along with the bulk of the air refueling fleet from Strategic Air Command (SAC). This combination of airlift, air refueling, and its supporting worldwide and stateside infrastructure is what is defined as air mobility. Although AMC belongs to the Air Force, there are organizations outside the Air Force that own and employ air mobility assets. For the purpose of this review, air mobility will mean those assets that already belong, or potentially could belong to the air component of the United States Transportation Command (USTC), normally executed by the Air Mobility Command.

## Why Should We Reengineer?

Some have argued over the need to update our way of doing business, essentially, to reengineer, with respect to air mobility. Conventional wisdom says that our processes seem to work just fine, given our recent military successes, and therefore there is no need to undergo costly and painful change just because we can. Nevertheless, there are some compelling reasons why we need to reengineer air mobility.

Air mobility is a precious, limited asset. There is not, nor is there likely to be, an enormous investment in military air mobility, to the point where there would be sufficient assets to move anything or anyone, anywhere and at any time. The sheer cost of purchasing and maintaining air mobility aircraft on that scale is untenable. Almost by definition, air mobility assets are limited. Furthermore, our nation has always depended on the commercial airline industry to augment its airlift capability, but not without costs of its own. These limits on both systems and overall cost drive the point that air mobility

is something special. In addition, the United States is the only nation with a truly robust, global air mobility force. Other nations have airlift and air refueling aircraft on some scale, but no others are capable of moving military forces by air as efficiently or as quickly. Air mobility is part of what separates the United States military from the rest of the world, and must be carefully watched over, if we continue to demand rapid global mobility for projecting our forces. Our nation has grown to depend on our ability to project force by air, and with the reduction in forward bases around the world, we require a robust airlift and air refueling capability to meet national objectives.

Outside of the inherent need to keep our strategic advantage in air mobility, the Secretary of Defense is leading the way to change our military, by way of force transformation. This impetus means that the time is now to embark upon meaningful changes, even those of a large scale. Without this important support from the Defense Department leadership, any changes made to the system are likely to be superficial. The directive to transform opens the door for serious efforts toward change for the better, and makes the possibility of reengineering air mobility very real. In the Secretary of Defense's own words: "We must transform not only the capabilities at our disposal, but also the way we think, the way we train, the way we exercise and the way we fight (11:1)." This vision can guide our efforts towards transformation and reengineering as well.

## II. Literature Review

### More About Reengineering

Business Process Reengineering (BPR) has its origins in 1993, with the first edition of Hammer and Champy's seminal work, *Reengineering the Corporation*. Their premise is that modern corporations frequently find themselves unable to meet their goals, or operate at optimum capability, because they are organized around old paradigms, and stuck using methods which were successful at one time, but do not work today. Some companies are organized around the "division of labor" concept, popularized by Adam Smith in his work, *The Wealth of Nations*. Under this idea, no single worker is responsible for an entire product, but each one is responsible for some small portion of its production. (13:14) Another traditional business practice is the structured bureaucracy. The origins of this practice are found in the 19<sup>th</sup> century and the development of complicated railroad schedules. Due to the incredible (for its day) span of control of the railroads, the companies developed complicated lines of authority and contingency plans for every conceivable issue, in order to prevent a collision on a single rail line capable of carrying trains in both directions. Workers were highly conditioned to act only in accordance with company rules, and thus the railroad companies were able to operate safely in an era of little to no command and control system capability. (13:15)

A third business paradigm is that of the assembly line, made famous by automaker Henry Ford. Ford broke down the complicated task of building a car into small tasks performed on the partially assembled vehicle as it moved "down the line." The moving assembly line brought the work to the workers, but increased dramatically the job of coordinating the people performing these jobs in order to end up with a car at the end of

the process. (13:16) The fourth business principle commonly used today is an outgrowth of Ford's factory system. Alfred Sloan of General Motors developed a system of small, decentralized divisions over which managers could monitor progress of the business. Essentially, Sloan developed a division of labor for the management function. (13:17)

One final factor in developing modern business thought is the huge economic expansion seen in the United States, beginning in the 1960s. Demand for products and services were enormous, and companies were only limited by capacity. Quality was rarely considered, as post-war/post Depression consumers were willing to spend their money on virtually anything. The result was rapid company growth, along with its pyramid-style management structure. However, the increasing complexity of goods and services in development forced an increase in the number of middle managers required to oversee the various processes. This in turn put the top management of a company very far away from the end users of their product or service.

Given these approaches to business management, there have been some important changes in customers, competition, and change itself, that are forcing modern companies to reexamine their management procedures. Modern customers now demand quality goods and services, and companies can no longer merely produce anything and expect it to be purchased. Modern competition has not only increased in volume, but also in type. There are more companies striving for a dwindling customer base, but now start-up, smaller businesses can enter a market much more quickly. Finally, the business environment is changing constantly. It is not enough to rely on old ways, and expect them to always meet changing needs. (13:17)

The Defense Department is certainly not a typical corporation, but it is not immune from the need to consider reengineering. The customers of DOD, the nation itself, have evolved insofar as what they expect our military to do. They expect leaner, highly mobile forces that can be anywhere on the globe within a matter of days. DOD's competitors, our adversaries, are changing as well. Proliferation of surface-to-air missile technology and the constant threat of terrorism are major changes to the air mobility environment. Finally, the constancy of change is most certainly a factor for DOD. Few if any would have predicted the sequence of events leading up to our current global war on terrorism. Nevertheless, today our nation finds itself in desperate need of a robust air mobility system, to meet our security needs. Reengineering offers us an opportunity to look at how we can best use this marvelous capability.

#### A History of Airlift

The first military airplanes were viewed primarily as combat platforms. They were either employed as simple bombers, or fighters to shoot down other aircraft, or perhaps used in a reconnaissance role. Because of their small size, the idea of moving large numbers of people and/or equipment was not practical. As a result, there was simply no such thing as airlift, outside of the movement of airplanes themselves from the factory to some military airfield. Prior to World War II, the only formal air transportation organization was the Ferrying Command. As part of the U.S. Army Air Corps Materiel Division, they were responsible for moving airplanes from one theater to another. The bulk of other forces moved by sea.

Eventually, airplane technology grew to the point where airplanes could carry significant numbers of personnel and some light equipment. The first dedicated transport

aircraft were eventually developed, and the Army Air Corps made its first efforts towards organizing airlift missions. In 1942, General Hap Arnold, Chief of Staff of the Army Air Forces, created the Air Transport Command, responsible for ferrying and transport operations outside of combat. Combat transportation was assigned to the Troop Carrier organizations. In the Pacific Theater of Operations, air mobility was first employed on a large scale to support a fielded force during wartime. Flying missions from India, over the Himalayan Mountains, affectionately called “the Hump,” Air Transport Command successfully resupplied 14<sup>th</sup> Air Force units in Burma and China that were cutoff from port access by the Japanese. From September 1944 until its termination, Brigadier General William H. Tunner commanded the operation, under the auspices of Air Transport Command.

After World War II, the United States again successfully employed airlift in times of conflict, during the resupply of Berlin, Germany, which had been cutoff by the Soviet Union. On 1 July 1948, the Military Air Transport Service (MATS) was created to be the “Single Manager for Airlift,” under the guide of now Major General Tunner. MATS established a task force called “Operation Vittles,” designed to maximize the flow of supplies from the West to East Germany. When the Soviets ended their blockade, it marked the first time airlift alone was successfully used as an instrument of national power. (35:26)

In the earliest days of strategic airlift, the Military Air Transport Service, headquartered at Scott Air Force Base (AFB), was responsible for operation of the air transport system. The Air Transport Command and the Naval Air Transport Service were mobility organizations born out of World War II, where worldwide mobility by air began in

earnest. MATS consolidated these two, and began operating a “military airline,” under the control of the newly independent U.S. Air Force. The role of MATS was essentially to operate scheduled service between airports. Transport flights moved passengers, cargo and mail for the Department of Defense. Operational control of these flights came from MATS Headquarters as part of their Transport Control System. This consisted of the Headquarters, Transport Control Center (TCC), Division TCCs, and Base TCCs. There were two divisions, the Pacific Division, or Western Transport Air Force (WESTAF), and the Atlantic Division (EASTAF). If airlift was required, DOD agencies submitted requirements to MATS, who scheduled the missions. (35:57)

Historically, the Air Force has distinguished between what it considered regular, transport operations, and airlift-type operations supporting combat operations. The Air Transport Command performed both ferrying and basic airlift missions, while the Troop Carrier Command was responsible for airdrops over the battlefield. MATS made one of the first distinctions between types of airlift aircraft. There were either “heavy” airlifters, such as the C-121, and “medium” aircraft for airlift, such as the C-54. The pictures below show both of these aircraft, and help to illustrate the lack of major differences between the two. Although the C-121 is larger overall than the C-54, both aircraft have four engines, are propeller-driven, and can only be loaded in one way: via the doors near the front and aft of the fuselage. Neither was capable of loading wheeled vehicles, and both could airdrop either troops or small packages out of the rear doors. The somewhat innocuous distinction between the two helped to further the distinction between strategic and tactical airlift.





**Figure 1 - C-121 Constellation**

**“Heavy” Airlifter**



**Figure 2 - C-54 Skymaster**

**“Medium” Airlifter**

Although MATS operated both “medium” and “heavy” airlifters, the distinction itself bred the notion that two different movement types could occur, possibly under different commands. The Berlin Airlift, however, demonstrated the need for possible augmentation of “strategic” airlift by “tactical” airlift aircraft. This also became apparent in the Korean conflict, where Troop Carrier-assigned C-54 aircraft were temporarily assigned to MATS to assist in the overall airlift supporting Korea. Nonetheless, rivalry between “tactical” airlift Troop Carrier units and “strategic” airlift MATS units was real. General Laurence Kuter, commander of MATS, recognized this fact, but made efforts to reduce the tension, while centralizing control of all airlift. He emphasized MATS Headquarters’ ability to handle the tactical aspects of airlift, without minimizing their importance. (31:189)

The Korean War brought a new concept in airlift operations: “one fleet of cargo planes....sufficiently flexible to handle airborne assault and airdropped resupply as well as airlanded movement of cargo and personnel.” (13:556) Because of the wide variance in airfields available, many different types of aircraft were required. The originally assigned C-54s in theater were limited because very few runways were available which

could support its weight. Instead, lighter C-46s and C-47s had to be brought in since they could negotiate the shorter, less well-maintained runways. Larger aircraft, such as the C-119, were used primarily as airdrop platforms, when suitable runways were not available. Two important conclusions resulted from the airlift experience in Korea. First, the need for an “all-purpose theater airlift type” of aircraft was identified. This would become a driving factor in production of future “tactical” airlifters. Second, the utility of larger transport aircraft was proven, as the introduction of the C-124 made an impact. It became evident that aircraft with greater load capacities could do the same airlift mission with fewer airplanes, fewer crews, and far less airfield congestion. This wartime experience thus accelerated the development of both “strategic” airlifters and the “tactical” version as well. Postwar airlift doctrine emphasized that “strategic and troop carrier airlift forces are so fundamentally different in mission and outlook as to preclude organizational consolidation,” and also that “strategic airlift requires consolidation of as many assets as possible under one airlift command in order to gain maximum efficiency.” (32:226)

Aircraft development after the Korean War centered around development of a new troop carrier along with a new strategic airlifter, to satisfy the needs of Tactical Air Command (TAC) and MATS, respectively. President Kennedy’s first official act after his inauguration in 1961 was to order an all-jet transport aircraft built to extend the reach of our armed services. The result of these efforts was acquisition of the C-130 tactical airlift aircraft, and the C-141 strategic airlift aircraft. These new aircraft were faster, larger, and could fly far greater distances than any previous airlift aircraft. This leap in aircraft technology, led to further exploration of the true capabilities of each type. Not content

with limiting C-130s to a purely tactical role, the Defense Department assigned them to MATS instead of TAC. Conversely, MATS was ordered to qualify their aircrews in airdrop operations, previously the domain of the tactical airlifter. Secretary of Defense Robert McNamara was a driving force behind these cultural changes, and noted the C-130 and C-141 would be “suitable for either mission,” and that “the distinction between troop carrier and strategic airlift operations...will no longer be significant.” (32:282) This marked a revolution in airlift doctrinal thought.

The Vietnam Era was marked by further efforts to consolidate airlift forces. In 1966, the Army and the Air Force came to agreement over who would lead development over tactical airlift platforms. The Air Force would own fixed-wing, tactical airlift platforms, while the Army would take ownership of all rotary-wing platforms. (32:304) Also during this time, debate continued over who should control tactical airlift forces. Many believed the tactical airlift mission was still significantly different from that of the strategic airlifters, and should be under the control of theater commanders, and tied to a particular theater only. Others noted the inefficiencies of required transloading between strategic and tactical airlift aircraft, and pushed for a “source-to-user concept” (32:337) that led to the development of the doctrine of “direct delivery.” Under this notion, an airlift aircraft would operate beyond the normal strategic airlift terminal, onward to the forward operating base, thus avoiding the need to transload, and saving time, aircraft and aircrews. Despite the doctrinal discussions, there was a clear distinction between the tactical airlift operation, operated by the 834<sup>th</sup> Air Division in Viet Nam, and the strategic airlift operated by MATS.

Another important event during this era was the Israeli Airlift of 1973, coined Operation Nickel Grass. Strategic airlift was the only available method for transporting materiel to Israel in the time specified by President Nixon. The only available airfield en route was Lajes Field in the Azores. For that distance, only the C-141A and the C-5A were capable of flying that distance with meaningful amounts of cargo on board. The utility of the extremely large C-5 was proven, as it significantly reduced the number of sorties and time required to move heavy cargo loads over great distances.

Airlift operations during Desert Shield and Desert Storm provided another important experience in our use of airlift forces. First, the Defense Department identified the need for upgraded equipment on-board the C-130 fleet to enhance its survivability in the wartime environment. Also, the lack of an in-theater staging base for strategic airlift crews proved to have a negative impact, as the longer sortie durations required to fly both into and out of theater overtaxed available crew flying hours prematurely (31:71). Fleet capacity itself was a major shortcoming, as the utilization rate was nearly tripled, despite activation of the Civil Reserve Air Fleet to augment airlift operations. Lack of available air refueling support was also identified as a problem, causing significant delays for fueling (especially with the C-5). Lastly, and perhaps most importantly, there was a dire lack of in-transit visibility of cargo and aircraft. There was no system for tracking the location of aircraft on a real-time basis, and no visibility on the cargo itself, resulting in massive backlogs of containers at the aerial ports, often with no record of what they contained. Finally, the need for the C-17 follow-on aircraft to replace the C-141 was analyzed, and studies showed the C-17 would have both increased strategic lift capability and reduced crew requirements, not to mention reduced maintenance costs overall.

## A History of Air Refueling

The most notable of the first air refueling flights was an experiment flown in the earliest days of military aviation, with an aircraft called the “Question Mark.” In 1929, a crew was able to keep an aircraft aloft for over 150 hours, by transferring fuel from other aircraft along a hose. This successful flight enabled future Air Force leaders, some of whom were part of the “Question Mark’s” crew, to consider the development of dedicated air refueling aircraft to bolster military capability.

With the advent of nuclear weapons, the Air Force struggled with developing bomber aircraft capable of striking the Soviet Union and returning successfully to the United States. Since no aircraft was capable of flying over such a long distance, Strategic Air Command pressed forward with development of air refueling aircraft, beginning with the modified KB-29 and KB-50, both of which were fitted with fuel hoses and drogues for refueling modified bombers fitted with refueling probes. The development of the “flying boom,” a fixed pipe that could be “flown” into a special receptacle on top on a receiver aircraft, enabled refueling at faster speeds, and with higher fuel transfer rates. The KB-97 was the first boom-equipped aircraft in mass-production, and its speed and range enabled the B-47 to be the first true intercontinental bomber. The KC-135 succeeded the KB-97 as the first all jet air refueling platform, and along with the KC-10, forms the backbone of air refueling capability in the Air Force today.

The original purpose of the KC-135 was to support the Strategic Air Command (SAC) bomber fleet, and as a result it was not important that the tankers themselves were air refuelable. However, other variants of the C-135 platform were later developed, all of which benefited from intrinsic air refueling capability. The EC-135 “Looking Glass” was

developed to be an airborne command and control platform, capable of running a nuclear war in the event of destroyed ground command posts. The importance of its mission drove a requirement to maintain at least one EC-135 airborne at all times. Such long sortie durations required the aircraft be air refueling capable. Another SAC asset, the RC-135, was designed for intelligence gathering, and also required very long sorties. It also incorporated a receiver air refueling capability.

Eventually, the utility of air refueling was recognized across the Air Force, not just in SAC. The first major air refueling effort outside of SAC was in support of the Viet Nam conflict. KC-135 tankers were deployed to Thailand and Guam in order to support offensive fighter operations over Viet Nam. The bulk of these forces came from TAC and the Pacific Air Forces (PACAF). This marked the first time air refueling was used as part of a combined air offensive operation. Airlift assets, however, were not air refuelable. The C-123 and C-130 tactical airlift aircraft were not refuelable in-flight, and the strategic C-141A airlifter would not be modified to the refuelable “B” model until 1977.

Air refueling was also performed by the Navy during the conflict, and marked the beginning of inter-service interoperability issues. Navy aircraft did not use the “flying boom” system for air refueling, as their tankers were generally smaller and could not offload large amounts of fuel. Instead, a probe and drogue system was the primary means of in-flight refueling. The KC-135 could be fitted with a drogue system on the end of its boom prior to takeoff, in order to support Navy refueling operations. The drawback to this arrangement was that the boom system could not be used for the

duration of the flight. In essence, the tanker was limited to supporting Navy refueling for its entire flight.

Operation Nickel Grass, the airlift support of Israel in 1973, marked the first time air refueling of airlifters was considered. Although the C-5A was capable of air refueling, this capability was not used during the operation because of questions concerning the wing structure of the aircraft. In addition, the C-141A was not capable of air refueling. The operation clearly demonstrated the need for air refueling capability for airlift forces. The Air Force realized the need for both air refueling and heavy airlift over large distances, at times without available en route bases. They made some significant decisions to enhance this capability. First, they moved to the C-141, to include air refueling capability along with its planned fuselage extension. In addition, a modification to the C-5 was initiated, to improve its wing structure so as to allow unrestricted air refueling operations.

In the 1970s, the Air Force began to develop a concept called the Advanced Tanker/Cargo aircraft, which would combine an airlift capability inside of a tanker aircraft, which would itself be air refuelable. This program resulted in the acquisition of the KC-10. Incorporating another lesson learned from the past, the KC-10 can switch from boom refueling to probe/drogue refueling in-flight, thus allowing easy interoperability with Navy aircraft. This combination airlift/tanker aircraft concept continues today with the proposed acquisition of the KC-767, a commercial widebody aircraft that will support both boom and probe/drogue refueling, and can carry a significant cargo payload.

## The Coming of Age of Air Mobility

Although airlift and air refueling aircraft were managed in two separate commands originally, the idea of combining their missions to create synergies was around for years before the creation of the Air Mobility Command. The C-141A was originally designed to be our first strategic jet transport, and though it was to be used over long distances, it did not originally have an air refueling capability. The success of jet-to-jet air refueling in the Strategic Air Command inspired users of the C-141A to consider the addition of such a capability. As a result, most of the C-141 fleet was modified in the 1970s to the C-141B model, which incorporated an air refueling receptacle. This greatly increased the range of the nation's top airlifter, and was such a success that the C-5 airlifter was designed from the outset to be air refueling capable.

Not to be outdone, those in the air refueling world began to consider alternate uses for their own aircraft. One of the important considerations in the acquisition of the KC-10 during the 1980s, was its employment in "dual-role" missions, whereby the aircraft could not only offload more fuel than the KC-135s, but could also be used to carry cargo and personnel on a large scale. Thus, the KC-10 is part air refueler, but also part airlifter, a capability foreshadowing the future union of these capabilities into Air Mobility Command.

The end of the Cold War in the early 1990s drove the need to reconsider our nation's force presentation and organization, especially with respect to our limited airlift and air refueling assets. In 1992, the Air Force underwent a huge reorganization, eliminating the Strategic Air Command, splitting its bombers and reconnaissance aircraft into the newly formed Air Combat Command, while sending the bulk of its air refueling aircraft to the



new Air Mobility Command. Some squadrons of tankers remained either in the European or Pacific theaters, and some aircraft were assigned to Air Combat Command, but by and large, air refueling became a primary mission for Air Mobility Command. This new arrangement enabled a more creative use of air refueling support for airlift missions, and for use of tankers in an airlift role when possible.

A primary lesson learned from the massive airlift provided to the US Central Command area of responsibility during Desert Shield was the need for more air refueling support for airlift missions. (31:74) Since that experience, the Air Force has used the air bridge concept in every major contingency, in support of rapid global mobility. In fact, air refueling support has been pivotal in the employment of the C-5. Lower than desired maintainability for the C-5 has driven the concept of the “double A/R,” by which the C-5 air refuels twice while airborne, ensuring it will not delay cargo at an intermediate fuel stop for a maintenance problem. The union of airlift and air refueling makes this type of mission a matter of course. Along the same lines, the KC-10 is routinely used to support fighter unit deployments, since its inherent cargo capability combined with its role as a tanker can move an entire squadron of aircraft, support equipment, and ground-based personnel, with a single KC-10. The newly approved lease of the KC-767 is billed as a “tanker/transport” along these same lines. Clearly, the merger of airlift and air refueling is here to stay.

#### Air Mobility Doctrine Development

In order to capture all the experiences and lessons learned from previous military engagements, the armed services develop doctrine. The Joint Doctrine Encyclopedia describes the purpose of doctrine. It is defined as “fundamental principles by which...the

military guide[s] their action in support of national objectives.” (16:253) General Curtis LeMay called doctrine “essential for sound judgment.” (16:253) Although air mobility has only been around for a relatively short time in the history of warfare, there has nonetheless been a substantial amount of development in air mobility doctrine.

We will analyze doctrine at both the Joint and Air Force levels. The history of airlift and air refueling gives us insight into how this doctrine was developed along the way. There has been some blurring of the lines between traditional long-haul transportation and combat air delivery. The C-130 was initially billed as the fastest airlifter in the fleet, when it first appeared on the scene, although it later gained prominence for its combat airlift performance in the Vietnam conflict. The C-141 was designed to be a fast, long-range transport, but it later was used as a combat airdrop platform during conflicts in Grenada and Panama. In fact, the Strategic Brigade Airdrop mission requirement continues today, in the modern C-17, the designed replacement for the “strategic” C-141.

Much of the history of airlift doctrine has revolved around consolidation. Since large, airlift aircraft are in high demand, the debate of who should control what has gone on since its inception. The overall trend seems to be toward overall consolidation of airlift assets. Starting with the consolidation of many separate airlift missions into MATS, continuing with the designation of MAC as a specified command, and today with both US Transportation Command and Air Mobility Command, the need to maintain centralized control over airlift is evident.

With respect to air refueling doctrine development, the road is less clear. For decades there was no formal air refueling doctrine, outside of its mention alongside other Air Force missions (33:3). This is not to say there was no amount of military experience with

air refueling. On the contrary, air refueling missions were well understood by tanker and receiver crews, as well as those responsible for acquiring new tanker platforms.

Nonetheless, it was not until the late 1990s that efforts were made to formally write operational doctrine for air refueling (15:3). Because this formal doctrine development occurred after the consolidation of tanker forces into Air Mobility Command, the doctrine was written with “air mobility in mind.” As airlift doctrine had a much longer history and was better understood by AMC leadership, some air refueling doctrine was written with a lean toward support of the overall air mobility mission, with somewhat less regard for traditional tanker roles in support of combat (i.e., fighter, bomber, reconnaissance) aircraft.

#### Joint Air Mobility Doctrine

Now we will take a look at modern doctrine for today’s air mobility forces. Air mobility doctrine is a hybrid of both operational doctrine, which concern operations in and of themselves, and logistics support, which deals with how to supply and sustain forces engaged in operations. It is somewhat unique in this respect. Most combat forces must be moved into areas where operations are to be conducted. Air mobility combat forces have the role of moving both themselves and the combat forces they support into the forward area. Therefore, it is important to consider not only the operational considerations of operating aircraft in combat, but also the logistics needs of supported forces as well.

Joint Publication 3-17 is the repository for joint doctrine on air mobility operations. Its key tenet is that air mobility forces are part of the National Air Mobility System (NAMS), which provides the President and Secretary of Defense with a capability for

rapid global mobility. The bulk of the NAMS is found in Air Mobility Command, but it also includes air mobility forces belonging to the geographic combatant commanders, and the armed services themselves. Pub 3-17 places the onus for directing the available air mobility forces on the supported combatant commander. The services themselves are to validate which of their requested movements should be performed by air. Also, the Air Force is given charge to provide airlift and air refueling support to all services and combatant commands. Centralized control and decentralized execution are highlighted as critical to the effective use of air mobility assets. The importance of detailed planning along with in-transit visibility of people and cargo is also pointed out. (20)

Joint Publication 4-0 contains doctrine for the Logistic Support of Joint Operations. It outlines responsibilities for supplying and supporting forces, however some of these responsibilities overlap. Combatant commanders have “directive authority for logistics,” giving them the ability to shift resources within their theater. The armed services themselves provide logistics support for their own forces, but the combatant commander is responsible for priorities between them. USTRANSCOM is in a unique position since it has responsibility for all “common-user” transportation and terminal services, and the combatant commanders have to coordinate with USTRANSCOM for movement requirements and required delivery dates. (23)

Joint Publication 4-01.1 concerns the Defense Transportation System (DTS). The DTS consists of the national transportation infrastructure available to support “common-user” transportation needs across the Department of Defense. It includes organic military capabilities, plus those contracted for or controlled by the Defense Department. “Common-user” is a term meaning provided for two or more Defense Department

agencies, and is normally applied to transportation services provided by USTRANSCOM. Joint doctrine emphasizes that assignment of transportation responsibilities should be the same, whether peacetime or wartime. The rationale here is the speed with which conflicts may arise, along with the fact that USTRANSCOM has a peacetime mission to move personnel and cargo worldwide, and to provide asset visibility for everything within the system. Creating such a system from scratch for every new conflict would result in either delays for its development, or inefficiencies and/or overlaps, which would hinder effective transportation and logistical support. (24)

Two important organizations are called for in the Joint doctrine for the DTS. The first is the Joint Transportation Board (JTB). The JTB is chartered to act on behalf of the Chairman of the Joint Chiefs of Staff, in order to monitor, and if necessary adjudicate, transportation requirements in times of crisis. In essence, the JTB serves as a kind of oversight for usage of the DTS. It is composed of high-ranking members of the Joint Staff, along with the Director of Logistics for each of the services. Another key organization is the Joint Movement Center (JMC). The JMC is responsible for coordinating all in-theater transportation to support the theater concept of operations. In summary, the Chairman of the Joint Chiefs of Staff is ultimately responsible for strategic transportation allocation (via the JTB), while the geographic combatant commander is responsible for theater airlift allocation (via the JMC).

#### Air Force Mobility Doctrine

Air Force air mobility doctrine expands upon Joint doctrine and enhances the “airman’s perspective.” Organization and Employment of Aerospace Power is the subject of Air Force Doctrine Document 2. It outlines the use of aerospace power in general, but also

begins to touch on the role of air mobility forces. It recognizes the “national asset” nature of air mobility, and also stresses the need to support the geographic combatant commander. It calls for a Director of Mobility Forces (DIRMOBFOR) to act as coordinating authority for all matters concerning air mobility in theater. The DIRMOBFOR works for the Commander of Air Force Forces (COMAFFOR) for the theater. The doctrine draws a clear line between “intertheater” air mobility operations, and those performed “intratheater.” Finally, basic doctrine recognizes that air mobility operations may be the only type of operations required in certain contingencies, and that many air mobility operations can occur outside the purview of an Air Operations Center. (3)

Air Force air mobility doctrine is further expanded in the AFDD 2-6 series. AFDD 2-6, Air Mobility Doctrine, highlights key ideas about Air Force air mobility. First, air mobility supports four tenets of aerospace power: centralized control/decentralized execution, flexibility and versatility, synergy, and priority. It also is pivotal in achieving the Air Force’s core competencies of rapid global mobility, agile combat support, information superiority, precision engagement, air and space superiority, and global attack. Again, a distinction is drawn between intratheater and intertheater air mobility. It highlights the importance of command and control of air mobility forces, using the Tanker Airlift Control Center (TACC) for intertheater forces, and Air Mobility Operations Control Centers (AMOCCs) for intratheater forces. (4)

Airlift doctrine is found in AFDD 2-6.1. Doctrine points out the two basic airlift delivery methods: airland, where cargo is simply offloaded at the airport, and airdrop, where cargo and/or personnel parachute from the airlifter into a drop zone. In addition,

mission types for airlift are defined, with emphasis on channel and special assignment air missions (SAAMs). Channel missions are flown over set routes, similar to an airline. They can be operated with a set frequency, or when a certain amount of cargo is required. SAAMs can operate to any location not served by the channel system. Finally, command and control of airlift forces is laid out. (5)

Air refueling doctrine is in AFDD 2-6.2. It defines two types of air refueling operations, either within a defined orbit area called an anchor, or along a define route called a track. Doctrine points out the wide variety of possible air refueling missions, to include support for nuclear strike forces, global attack support, air bridge support, deployment support, theater support, special operations support, emergency air refueling, plus combat search and rescue. It goes on to point out possible usage of air refueling aircraft in either an airlift or perhaps an aeromedical evacuation role. As in the case of airlift doctrine, the air refueling doctrine points out the desired command and control relationships for air refueling forces. (6)

Air mobility doctrine has grown and changed over the course of time, just like any other type of military doctrine. In addition, air mobility doctrinal changes have happened in concert with changes in mobility technology. Although early pioneers in aviation most likely envisioned a day when tanks could be brought to a forward base by air, they were limited by what they could, in fact, actually build. The earliest airlift aircraft were only capable of carrying people in somewhat large numbers, but not much in the way of heavy equipment. As a result, mobility doctrine in general required the bulk of forces, both personnel and equipment, to move by land or sea. Only time critical personnel, such as leadership or perhaps aeromedical evacuations, were to move by air.

Airlift aircraft eventually grew in capability to drive changes in doctrine. The C-119 Flying Boxcar was capable of carrying a number of vehicles, along with personnel. The C-124 Globemaster II enhanced this capability even further. All the same, in order to bring a sizeable enough amount of equipment into a forward area, a large number of aircraft sorties were required. This drove the creation of an air bridge, similar to that used during the Berlin Airlift. If enough crews were available, the aircraft itself could continually move back and forth from supply base to forward base.

Air refueling capabilities, in both the tankers and receiver aircraft, also brought about some important doctrinal changes. The development of the flying boom enabled much higher fuel transfer rates, and thus receiver aircraft could fly longer in between refueling. Jet powered tankers and receivers increased aircraft usable range exponentially.

Although this capability was originally envisioned for bomber aircraft alone, airlift operations over long distances could also leverage this capability if it were available. Operation Nickel Grass, supporting Israel from American bases, had a large influence on the modification of the C-141A to the air-refuelable C-141B, the development of the C-5's air refueling capability, and in the procurement of the huge KC-10 air refueling aircraft. With airlift aircraft that could refuel mid-air, plus tankers of extremely long range which could themselves refuel as a receiver, mobility planners could count on a true global mobility capability. Eventually, units began to plan on moving their units by air rather than by surface. New equipment was developed with air transportation in mind. Army equipment had to demonstrate its ability to be air transportable.

Another important development, and one which is critical as a lynchpin of any serious reengineering efforts, is the progress of information technology in the field of air



mobility. At its outset, airlift during the 40s and 50s had to rely on the telegraph and telephone, which were relatively unreliable, along with paper-based record keeping, which was highly prone to human error. Because of the difficulties involved in communicating over such long distances with any frequency, volume, or level of security, the geographic theater commander was relied upon to manage his own mobility resources using whatever communication capability existed in theater. With the advent of reliable, global telecommunications, both secure and non-secure, effective command and control of aircraft can be maintained from a central point quite effectively. In addition, information technology has enabled the possibility of true in-transit visibility (ITV), allowing insight into the global supply chain.

One additional factor in air mobility doctrine concerns the numbers of available air mobility assets. Because of the increases in both cost and capability, there have been fewer and fewer air mobility assets procured over time. There are over 500 KC-135s in the inventory, but less than 60 KC-10s. More than 300 C-141s are being replaced by 180 C-17s. This reduction in actual aircraft has created an importance of centralized control over air mobility aircraft. There simply aren't enough aircraft to assign multiple squadrons of airlift and air refueling aircraft to every geographic combatant commander. This in turn has driven doctrinal control of most air mobility aircraft to a single commander, responsible for providing transportation services to all geographic regions as required.

#### The Doctrine of Operational Control

Command relationships play a crucial role for any business, and this is especially true in the military. Knowing "who works for whom" is critical to the understanding of business

processes. These relationships are especially important in the military, as military personnel are often reassigned to support contingency operations. Sometimes a deployment has no effect on standard command relationships. On the other hand, a deployment often means a change in who has command over a given unit. Because of this, military doctrine makes a point of defining command relationships whenever possible.

Every keystone publication in both joint and Air Force doctrine makes a point of defining these command relationships, and air mobility doctrine is no exception. In Joint Pub 0-2, Unified Action Armed Forces, command and control of military forces is defined. Authority for command of the military is vested in the President of the United States, and is executed through the Secretary of Defense. Employable combat forces are organized into unified commands. The leaders of these forces exercise “combatant command” or COCOM over their assigned forces, and this COCOM cannot be delegated or transferred. The next level of command and control is called “operational control” or OPCON. OPCON is command authority exercised by either the combatant commander or commanders at lower echelons. OPCON gives commanders authority to perform military operations with forces assigned to them. Forces can be assigned temporarily between combatant commands, when approved by the Secretary of Defense, and this is called a “change in OPCON” or CHOP.

Joint doctrine calls for “unity of action” within a combatant commander’s theater. American military power is employed under Joint Force Commanders (JFCs). Therefore, forces assigned to temporarily augment a JFC’s own forces normally undergo a CHOP to preserve this unity. It is important to note, however, that merely operating within a

geographic commander's theater of operation does not automatically result in a CHOP. US Transportation Command's assets, and in particular, strategic airlift forces, do not normally CHOP to the theater. Other air mobility forces, such as air refueling aircraft, are CHOPped. (18)



Joint doctrine states there are three levels of war: strategic, operational, and tactical. Strategic warfare supports national strategy. Operational warfare supports strategic war within a large area of operations. Tactical warfare is found on the battlefield. With airlift, two levels of support are normally discussed: strategic and theater. Theater airlift is more along the lines of what joint doctrine terms “operational,” as it supports a combatant commander’s entire area of operations.

Maintaining control over any large organization is no easy task. It requires not only robust command, control, and communications systems, but also solid doctrine, well understood by those who rely on the organization. Air mobility’s somewhat unique position of supporting a theater of operations without working for the theater JFC creates complications. Therefore, it is important that everyone clearly understand modern air mobility doctrine.

Unfortunately, many do not fully understand or embrace current air mobility doctrine. The issue is further complicated in that our doctrinal processes do not fully leverage our current capabilities. Historical events, the progress of aircraft design, and old, war-fighting paradigms have driven our doctrine with respect to air mobility. In spite of our rapidly growing ability to project forces, it has taken time to fully realize the need to consolidate and unify their command and control. At times, there have been efforts to take control of long-range airlift forces for exclusive use by a single theater commander, thereby limiting their use to one particular region of the world. The Department of Defense eventually realized the need to consolidate its air mobility functions, in order that air mobility assets can be used effectively across the global spectrum of operations. This eventually to the creation of today’s Air Mobility Command, United States

Transportation Command (USTRANSCOM), and the Defense Transportation System. Ever since the advent of mass transportation via airlift, there has been a range of opinion as to how it should be used, and who should control it. Because air power came into its own during World War II, the primacy of theater commanders had a major influence on air mobility usage. Over the years, visionary leaders have recognized the need to employ air mobility as a global asset. However, in times of conflict, we continue to transfer operational control of tactical airlift and air refueling units to theaters, and expect them to utilize these air mobility assets efficiently, in conjunction with the global air mobility system. Even the highly capable C-17 airlifter has been used in a theater-type role, ostensibly to help the theater commander meet their transportation needs. The global security situation is in a nearly constant state of change, coupled with an increasing demand to position our home-based forces to worldwide locations in a matter of days. The nation's ability to meet challenges throughout the world requires non-geographic control of air mobility forces. With this seeming dichotomy in place, the Department of Defense and the Air Force must consider how to effectively employ air mobility forces now and in the future.

#### Defense Transportation Regulations

With a firm understanding of air mobility doctrine in place, we now need to look at our current air mobility processes. Transportation by military air is governed by the Defense Transportation Regulations, the DODR 4500.9 series. Originally, each military department had their own rules governing air movements. Eventually, however, the Defense Department realized the importance of centrally managing all military transportation resources, especially airlift. In 1993, the Department of Defense issued a

directive making the Commander of USTRANSCOM responsible for providing common-user lift to all services, both in times of peace and war. Previous to this, including the massive amount of air mobility support for Desert Shield and Desert Storm, USTRANSCOM was only responsible for peacetime transportation. (9) Furthermore, USTRANSCOM was given sole authority for development of the Defense Travel Regulations in 1995. (9) Outside of doctrine, the DTRs define the business processes involved in use of the DTS. The DTRs have six sections, but the first three are of interest for the purpose of this study: Part I, Passenger Movement, Part II, Cargo Movement, and Part III, Mobility.

DTR Part I, Passenger Movement, sets the policies and procedures for movement via the DTS. On a policy level, it formalizes the assignment of AMC to USTRANSCOM under its combatant command, as well as all common-user transportation assets of the services. With respect to air travel for individuals, Part I requires use of Civil Reserve Air Fleet (CRAF) partners to the maximum extent possible. It also requires individuals to use existing AMC channel airlift unless mission degradation would result. The purpose here is to support a robust DTS, which includes contracted channel flights. The point is also made that this policy helps to spread the cost of maintaining the DTS to all the services, since all are users of the DTS. Part I also defines procedures for obtaining a SAAM aircraft if mission requirements dictate. (9)

DTR Part II, Cargo Movement, mirrors the policies in Part I, but emphasizes the role of the transportation officer. The TO must assign a priority to the cargo for movement within the DTS. Only the top two priorities are generally moved by air, with the rest

being moved by surface, land or sea. Like Part I, Part II is very detailed with respect to required documentation for cargo moved through the DTS. (9)

DTR Part III, Mobility, concerns the use of the DTS in times of crisis. With reference to deployment operations, it specifies the two ways to use airlift: either via the Joint Operational Planning and Execution System (JOPES) or as a SAAM. Air transportation through JOPES comes as a result of USTRANSCOM satisfying the demands of an approved Operational Plan (OPLAN), which has a time-phased, force deployment database (TPFDD) associated with it. Extensive coordination is required between the combatant commander and USTRANSCOM to coordinate the sequence and priority of air mobility missions. Outside of an existing OPLAN/TPFDD, a SAAM is required to deploy forces by air. Once forces are in place, sustainment operations are supported by channel-type airlift. USTRANSCOM works with the theater commander to establish sustainment channel missions as required. Missions to the final aerial port of debarkation (APOD) can be performed either by the theater's own airlift resources, or by "direct delivery," where AMC missions fly directly to the final APOD instead of an intermediate theater hub. Additional coordination for direct delivery missions is required. Also, an "express" service can be established, flown by either CRAF or organic assets, between a CONUS hub and a theater hub, for expedited sustainment support. (9)

### The Air Mobility Mission

Before analyzing air mobility processes with an eye toward reengineering, it is important to understand not only the history, doctrine, and regulations involved, but also the mission of air mobility. Understanding of the mission provides insight into what the Defense Department hopes to achieve with its air mobility forces. Two mission



statements are worth noting: that of USTRANSCOM, and that of AMC. The mission of the United States Transportation Command is “to provide air, land, and sea transportation for the DOD, both in time of peace and time of war.” (36:1) The mission of Air Mobility Command is defined in Air Mobility Command Mission Directive 701: “[The Air Mobility Command] Provides airlift, air refueling, special air mission, and aeromedical evacuation (AE) for United States forces. Also supplies forces to theater commands to support wartime tasking.” (7) With these mission statements in mind, we can begin to analyze air mobility business processes, in the context of the air mobility mission, in order to identify areas in need of reengineering.

### **III. Methodology**

#### **Fundamentals of Business Process Reengineering**

It is not entirely practical to undergo a full business process reengineering effort in the scope of a single research paper. The “process of reengineering” involves a corporate-wide effort, beginning with the leadership, and following through to all levels of process owners and users. However, this paper will outline some routes this reengineering might take, and offer some possible outcomes.

In its essence, business process reengineering is defined as “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed.”

(13:35) This definition contains four key words: fundamental, radical, dramatic, and processes. It is rethinking at a fundamental level because you must take a look at the most basic tenets of the business itself. It requires one to ask, what is it that we do, and why. It is a radical redesign, because this will encourage reengineering efforts to think outside the box, in order to come up with better solutions. Superficial changes are not the point of reengineering. Neither are marginal improvements to business processes, and hence the importance of the word dramatic when describing the improvements to come. Not every company needs to reengineer, but both companies that see trouble on the horizon, and those in peak condition, will want to reengineer to avoid future problems and/or maintain their lead. Finally, BPR wouldn't be what it is without its focus on processes. Most workers, and especially those in the military establishment, are focused on tasks, not processes. Reengineering focuses on process first, worrying more about the big picture and less about how each individual step in the process (i.e. task) is performed.

Using this basic definition of BPR, we will apply its principles to the latest iteration of air mobility doctrine. First, we must find areas where functional stovepipes exist, where customer focus seems to be lost, where task is more important than process, and outputs are measured more than outcomes. Once these areas are discovered, we can make a start towards applying reengineering principles to them. These principles include: rule breaking, creative use of information technology, combining several jobs into one, and developing a hybrid of centralized and decentralized processes. The more dysfunctional the current process, the more of these principles we will be able to apply.

#### Fundamental Air Mobility Principles

One critical point needs to be made here concerning the limits of reengineering. BPR itself cannot determine what businesses should do. It can help businesses do what they do better, but it cannot, by itself, define what's right for the business in terms of its overall mission and purpose. Here, we must rely on the business' own mission statement and/or vision, to lay down the direction in which to go. Fortunately, the military has a well-defined set of roles and missions, many of them determined by public law.

Throughout doctrine, there are lists of what are considered "essential truths" or "timeless principles." We will incorporate these key tenets of military doctrine into our analysis, and compare current air mobility doctrine to them. Those doctrinal areas that seem to violate these principles will be considered potential candidates for reengineering. Below is a list of some important essential truths that we will apply to air mobility doctrine.

**Principles of War:** objective, offensive, mass, economy of force, maneuver, unity of command, security, surprise, and simplicity. (18:10)

**Joint Warfare Fundamentals:** unity of effort, concentration, initiative, agility, extension, freedom of action, sustainment, clarity, knowledge. (18:40)

**Enduring concepts:** strategic agility, overseas presence, power projection, decisive force, forcible entry, timeliness, survivability. (18:56)

**Enduring enablers:** people, technology, information superiority, global command and control, air, land, sea, and space control, strategic mobility, sustainment, intelligence, surveillance, and reconnaissance, assured access to the battlespace, national will, force protection. (18:58)

**Tenets of Command and Control:** clearly defined authorities, roles, and relationships, information management, implicit communication, timely decision making, robust integration, synchronization, and coordination mechanisms, battle rhythm discipline, responsive, interoperable support systems, situational awareness, mutual trust. (17:15)

**Tenets of Aerospace Power:** centralized control, decentralized execution, flexibility, versatility, synergy, persistence, concentration, prioritization, balance. (1:21)

**Air Force Core Competencies:** air and space superiority, precision engagement, information superiority, global attack, rapid global mobility, agile combat support. (1:27)

**Joint Vision 2020 (JV2020) Concepts:** overseas presence, power projection, decisive force, and strategic agility. (30)

**JV2020 Tenets:** dominant maneuver, focused logistics, precision engagement, and full dimensional protection. (30)

**Principles of Logistics:** responsiveness, simplicity, flexibility, economy, attainability, sustainability, survivability. (16:595)

Obviously, not all of these principles and concepts can be directly applied to air mobility doctrine. However, most of these ideas do, in fact, apply to our analysis, and help to shape any efforts towards reengineering the processes.

Joint Publication 3-17 tells us the overarching purpose of air mobility forces is to support Rapid Global Mobility. This means our air mobility forces must be able to rapidly deploy and sustain forces anywhere on the globe. Although any military force should follow the important principles and tenets mentioned here, air mobility's primary role is to deploy forces around the world, and to properly sustain them once they are deployed. This will play an important role in our analysis, for identifying the customer, highlighting stovepipes, and emphasizing outcomes over outputs.

For the purpose of this paper, two important assumptions will be made. The first assumption is that formal, air mobility doctrine is always used as a starting point for developing air mobility planning and operations. It is important to know this is not always the case. There have been times when air mobility support was not considered at the outset, or not originally thought to be part of an operation at all, only to have problems later on which require a robust air mobility solution. The second assumption is the anecdotal evidence discovered during the course of my research is representative of all recent experiences with air mobility operations. This paper has made a concerted effort to interview key players with recent experience, but realizes this may not be a true representation of how air mobility operations are actually taking place.

Our analysis will be centered on doctrine. Although no operation goes exactly "by the book," it is still the starting point from which air mobility operations are developed. If our doctrine is flawed, we are likely to build plans and begin operations that contain the

same process flaws found in our doctrine. Furthermore, reengineering depends on identifying functional stovepipes, identifying the customer, and emphasizing outcome instead of output. Wherever possible, this paper will employ these important ideas in order to highlight areas in need of reengineering.

Our analysis will also look at recent airlift operation experiences. It will compare the operational structure with doctrine, and then go on to analyze the business processes involved. Interviews with key personnel involved in airlift operations supporting Operation Enduring Freedom, including theater airlift, strategic airlift, the Tanker Airlift Control Center, USTRANSCOM, and the Air Mobility Division for Operation Enduring Freedom will be conducted and reviewed.

Finally, we will look at air refueling operations. We will use both interviews along with concurrent research in the area of air refueling to reach some consensus as to how these operations are working today. Given these, we will again offer recommendations for process improvement.

## **IV. Analysis**

### **A Reengineering Disclaimer**

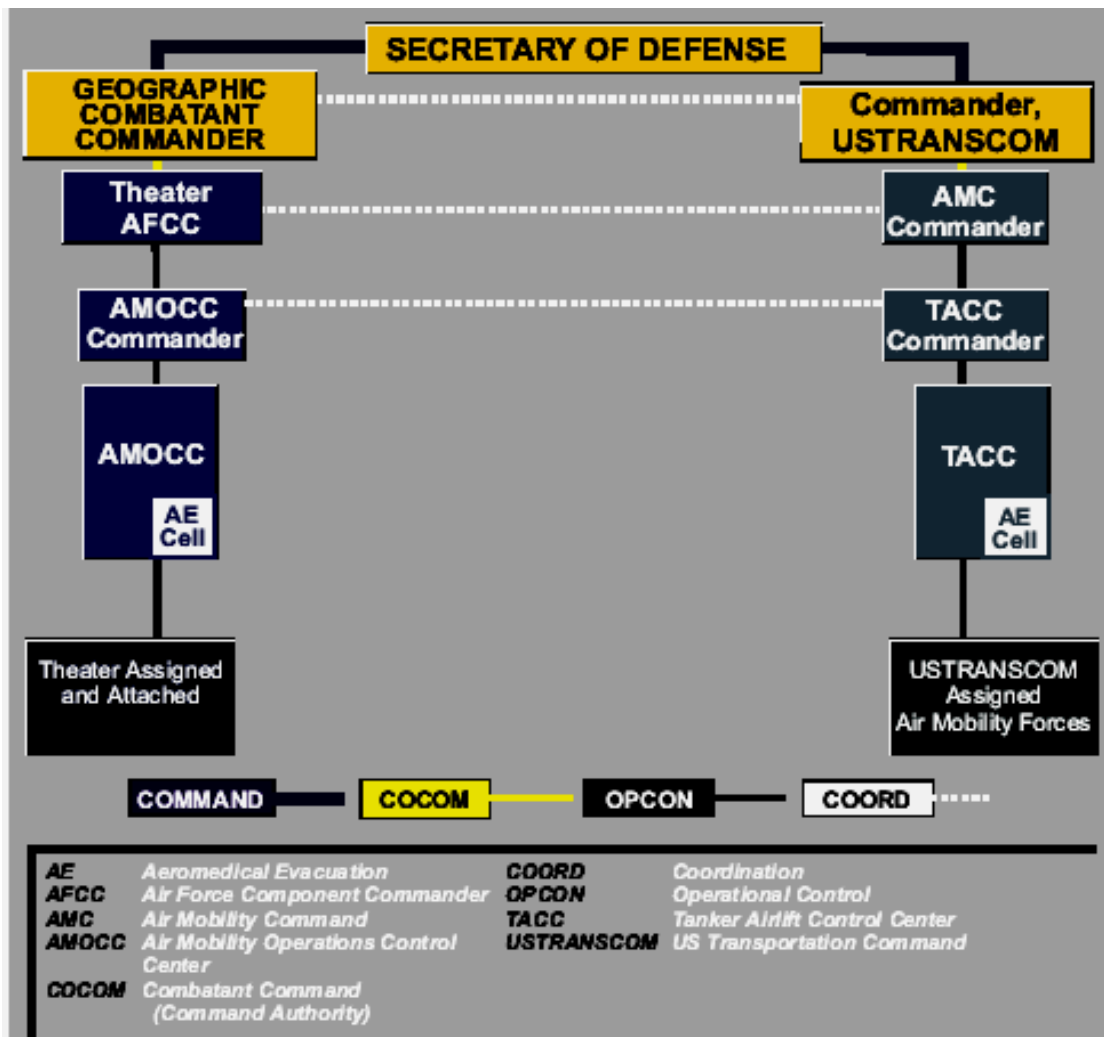
Before going in depth to analyze some important air mobility processes, it is important to understand what business process reengineering can and cannot do. Business process reengineering is an outstanding tool for mapping processes to goals. If the mission or outcome is clearly understood, then reengineering can make reaching those goals better. However, reengineering itself is not a tool for determining what goals should be sought after. It cannot, for example, tell you if it is better to have forces and equipment stationed in every part of the globe instead of keeping most of them at home and using rapid global mobility to get them to areas of conflict. However, if rapid global mobility is a stated goal of our armed services, then reengineering can definitely assist in assuring the most effective rapid global mobility possible. With this important disclaimer in mind, we can now look at a few key air mobility business processes.

In order to optimize our analysis we must adopt a reengineering point of view. An important step is to attempt to learn what functional stovepipes exist within air mobility business processes. These stovepipes have the tendency to center around particular tasks, and not the overall process. A task focus limits our ability to complete the whole process, and limits the overall ability to achieve the mission. Another important step is to define the customer of the process under review. A customer focus helps to keep process ahead of task in any business, and the military is no exception. Other hallmarks of reengineering are “breaking the rules,” “fundamental rethinking,” “radical redesign,” “dramatic improvements,” use of information technologies, and looking at combining several jobs into one.

## Peacetime Air Mobility

Air mobility assets have a somewhat unique situation from their combat air force counterparts, in that they have a full-time mission, even in times of peace. Air mobility plays a critical role in sustaining our nation's infrastructure, both stateside and worldwide. Like the combat air forces, air mobility forces frequently participate in various exercises and training missions. However, air mobility forces fly both channel missions, over generally fixed routes, and special assignment air missions, when channel missions are not sufficient or available for the lift requirement. The "real-world" nature of these missions requires a robust command and control function to manage both the missions themselves and the limited number of air mobility assets available to perform them. Currently, this role is filled by the Tanker Airlift Control Center, for most air mobility assets, or the Air Mobility Operations Control Centers, or AMOCC, in the European and Pacific theaters. Here is how these relationships are setup in doctrine.





**Figure 4 - Routine Command and Control of Mobility Operations**

A limited amount of permanently assigned, theater-specific airlift and air refueling aircraft are controlled via the AMOCC. Currently, only the European and Pacific theaters have their own airlift and air refueling aircraft. Both theaters have squadrons of C-130 transports, and KC-135 tankers. The rest of the air mobility forces come under the command and control of USTRANSCOM, through Air Mobility Command.

An obvious seam in this particular arrangement is when AMC assets operate missions through either the European or Pacific theaters. Normally, these global reach missions have little to no contact with theater-controlled assets, and vice versa. AMC has its own

enroute fixed infrastructure throughout the world, much of it in both the European and Pacific theaters, designed to control AMC missions only. If an available AMC asset cannot meet a lift requirement, further coordination is required between the TACC and the theater AMOCC to utilize their capabilities. This is an obvious inefficiency. Since the overall goal is to satisfy lift required by a geographic commander, and if most times that lift is coming from AMC and not the theater's own assets, it brings into question why should the theater own their own air mobility assets in the first place. Another potential problem deals with in-transit visibility (ITV) between theaters. If the two theaters use different systems for providing ITV, the chances of losing visibility increase as the data must be translated from one system to another.

A further complication will soon arise with the addition of the C-17 airlift platform into bases owned by the Pacific Air Forces. Currently, there is a plan to base squadrons of C-17s at both Elmendorf AFB, Alaska, and Hickam AFB, Hawaii, both PACAF bases. Given their tremendous capability, tying these assets to theater missions would most likely result in underutilization of these aircraft. The Mobility Requirements Study-2005 assumes that AMC will manage these aircraft for global missions, not merely one theater. If a particular geographic command retains control of these aircraft, AMC stands to lose a lot in the way of both efficiency and effectiveness because of the additional coordination required to use a PACAF C-17.

#### Air Mobility for the Joint Task Force

Below is a description of the doctrinal arrangement for air mobility support to the JTF.

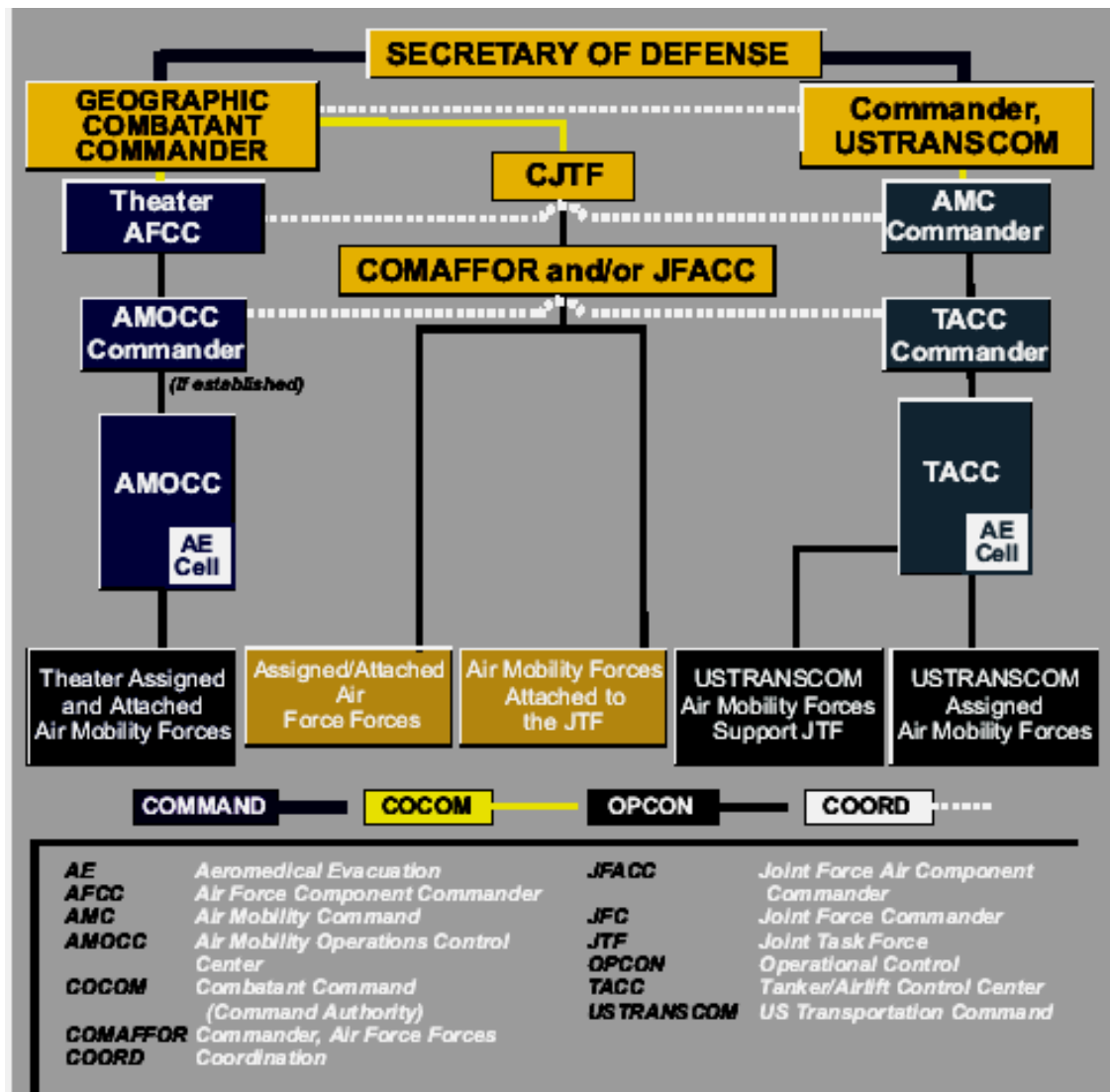


Figure 5 - Command Relationships for Mobility Forces Attached to a Joint Task Force

The President, through the Secretary of Defense, organizes the armed forces into Unified Commands, under the Combatant Command (COCOM) of either a geographic or functional Combatant Commander. Some Unified Commands have subordinate unified commands, such as is the case with United States Forces, Korea (USFK), which is a subordinate unified command under United States Pacific Command. However, sometimes situations arise where neither the Unified command, or its subordinate unified command are best suited to deal with a particular contingency. In these cases, the

combatant commander can establish a Joint Task Force (JTF), either geographic or functional, to handle the contingency. When a JTF is established, air mobility force presentation changes from normal peacetime operations. Joint doctrine currently calls for two possible force presentations for air mobility operations supporting a Joint Task Force. One is dedicated air mobility support, without changing operational control. These are AMC forces set aside for support of the JTF. Another possibility is attaching air mobility forces to the JTF itself. This process involves a change of operational control, or CHOP. These forces fall under operational control of the Commander, Air Force Forces, and/or the Joint Force Air Component Commander, which in turn reports to the JTF Commander. They become essentially tied to the theater for the duration of the conflict, as only the Secretary of Defense may CHOP forces. This can have some unintended effects, which we will examine further.

In the case of air mobility assets CHOPped to the theater, it is not a simple matter of providing capabilities to the geographic JFC. Air mobility assets have significantly longer range than other aircraft, and frequently operate on a global basis. They may also find themselves based in one particular geographic region, yet supporting operations in a different region. A CHOP of an air mobility asset removes that asset from global consideration, and ties it to one geographic area. This has an adverse impact on all other users of that air mobility asset, as now additional coordination is required for non-theater usage of a particular air mobility unit.

#### Air Mobility in the Joint Air Operations Center

If the nature of a particular contingency warrants, the Commander of a Joint Task Force may establish a Joint Air Operations Center to manage all air efforts for the contingency.

When a Joint Air Operations Center is established, a much more complicated arrangement for air mobility forces is called for, to include a Director of Mobility Forces, or DIRMOBFOR. Below is the doctrinal arrangement.

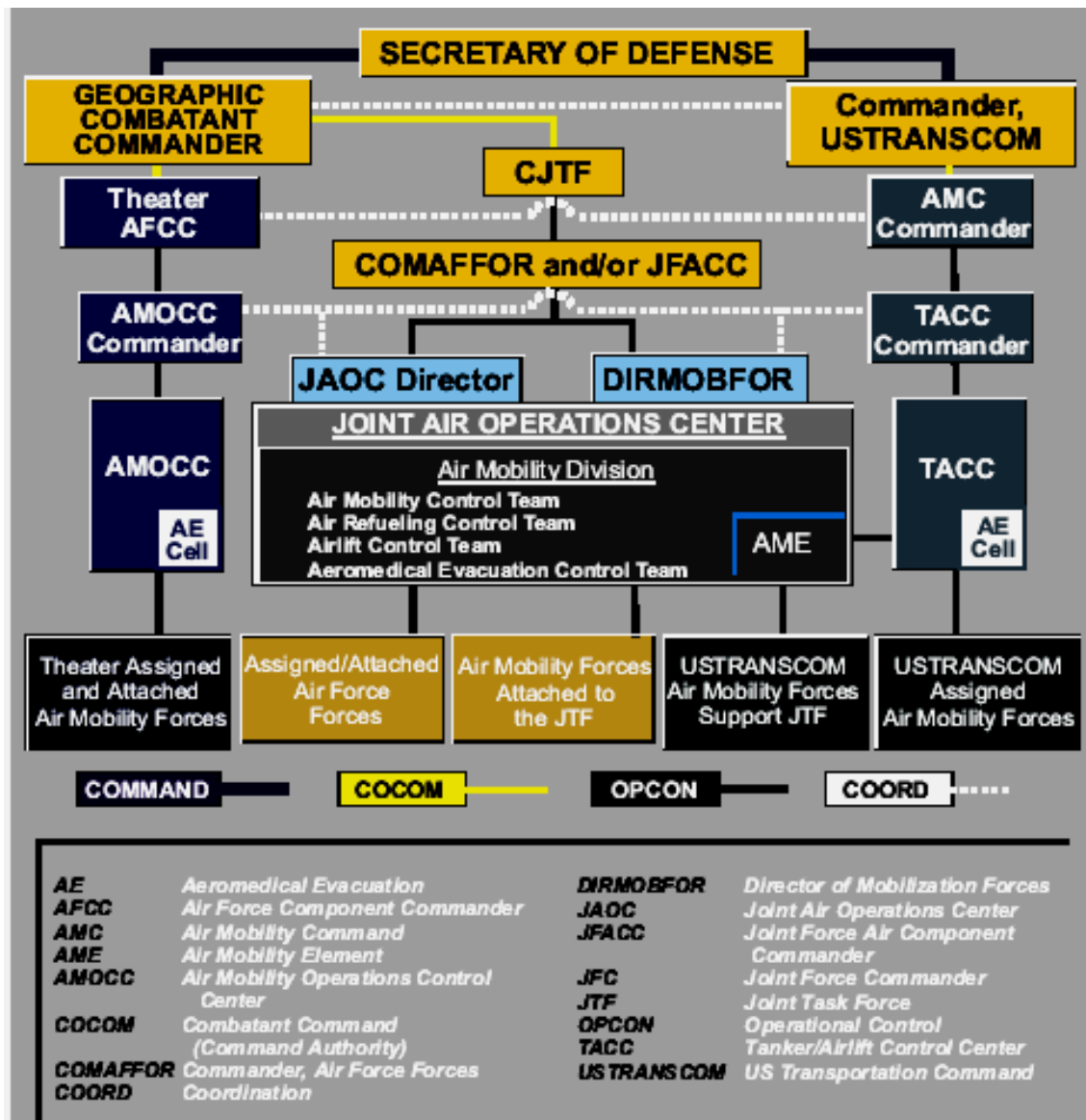


Figure 6 - The Joint Air Operations Center and Command Relationships for Air Mobility Forces

Under the JAOC, there is an Air Mobility Division, which includes an Air Mobility Control Team, and Air Refueling Control Team, and an Airlift Control Team. A Director

of Mobility Forces, or DIRMOBFOR heads these teams. In addition, an Air Mobility Element, under the control of the TACC, is included within the AMD, in order to coordinate air mobility operations from outside the theater to within the theater.

There is a built-in dichotomy in our nation's military logistics system. It stems from our premise that geographic combatant commanders are responsible for their own logistics in-theater. This drives the deployment of tactical airlift and air refueling capability to theaters. There are obvious seams in this arrangement, and the entire logistics process needs to be analyzed from a customer perspective. Given USTRANSCOM's charter, it may be possible to extend their sphere of influence with transportation all the way to the point of need, not just to a few large aerial ports within a large geographic area of operations

The idea of theater control over airlift aircraft continues through to the modern era. During Operation Enduring Freedom, a new twist on the paradigm of operational control was attempted with the C-17, a strategic airlifter with tactical landing capabilities. For the first time, a C-17 squadron was deployed to a forward operating base, rather than operating a stage while retaining its CONUS base. However, the squadron itself was not CHOPped to the theater, allowing TACC to retain ultimate control over the aircraft. Nevertheless, scheduling for these C-17s was not performed by the TACC, but instead was done by the Air Mobility Division at the Air Operations Center. This "control of scheduling" was unofficially coined, "sched-con." The idea was to maximize in-theater lift, leveraging off of the larger cargo capacity and short-field capability of the C-17, ostensibly to augment existing C-130 theater airlift operations.

There were significant problems with this arrangement. First, rather than augmenting existing theater lift, the C-17 deployment effectively put the C-130 fleet “out of business” by reducing the cargo backlog for the C-130 channels to “almost nothing” (37). In addition, the supporting relationships for such a deployment were not clear. The theater did not have OPCON, and therefore did not prioritize logistics support for the unit itself. At times the aerospace ground equipment required to maintain the aircraft were not provided since it was unclear to some who should have responsibility. Another problem area concerned waiver authority. Without OPCON, the theater commander did not have the authority to waive requirements for crew duty day, defensive system requirements, etc. However, the daily scheduling of the C-17 squadron caused them to be treated like other theater-assigned assets. The theater DIRMOBFOR attempted to provide waivers on some occasions that should have only come from AMC via the TACC. (14)

Another major seam in the processes of wartime air mobility has to do with air refueling missions. Under current doctrine, air refueling planners are functionally aligned with the AMD, under the direction of the DIRMOBFOR. However, this arrangement fails to account for the differences in mission types between airlift and air refueling. The air refueling mission is a type of combat sustainment operation, but unlike airlift, which can be delivered early or might be acceptably late, air refueling is a time-definite operation. Tanker missions must be available at the exact time required by receiver aircraft or their mission is useless. Because of this, tanker planning and execution must be fully integrated into the theater air tasking cycle. This cycle includes target development, weaponeering allocation, development of the air tasking order, and force execution. (22)

The distance between a potential target and the base used to launch the strike platforms

can determine tanker requirements. Also, weapons carried by strike aircraft impact their overall range, which in turn drives their need for air refueling. The divisions within the AOC responsible for the air tasking cycle are primarily Combat Plans and Combat Operations, which are responsible to the Air Operations Center Director, not the DIRMBOFOR. (3) Experienced tanker planners have seen the need for a change in this process. The simple addition of air refueling into existing airlift processes in the AOC fails to account for the mission differences and results in inefficiencies. (34) A doctrinal change here will undoubtedly enhance our ability to employ air refueling during contingencies.

One important aspect of contingency operations with respect to air mobility is wartime movement prioritization. During peacetime, movement priorities are established by using the JCS Transportation Priorities, found in Joint Pub 4-01. These priorities provide for a wide range of mission types, and clearly delineate which missions are more important. However, wartime prioritization uses the same scheme, and there is only one priority for all contingency air movements. Therefore, every wartime air mobility mission seems to have the same priority. Clearly this is not the case, but until a wartime priority system is implemented, air mobility mission planners will have no insight as to how best satisfy their customer. An example of how the lack of an effective priority movement system can result in large inefficiencies is the cargo backlog during Desert Shield. Efforts to rush anything and everything into the theater as soon as possible resulted in some cargo arriving at aerial ports with no one ready to receive it. Eventually, full cargo yards of unclaimed containers with unknown contents appeared. (31:87)



## **V. Conclusions/Recommendations**

Change is constant. This has proven itself true for our nation's military now more than ever. In Operation Iraqi Freedom, the United States used speed and mobility of land forces, operating under an air superiority umbrella maintained since the end of Desert Storm, to accomplish many of their military objectives in less than one month. Just as we had rewritten the "rules of war" in 1991 by using overwhelming air superiority even before any ground troops crossed the border, we have shown our ability to change once again in 2003. The point is, we will continue to make changes to our military, because of the lessons we learn in combat, and the progress we make in technology. When world events threaten either our position as the world's only superpower, or our national security itself, then we must change to compensate.

In terms of our nation's air mobility, we have been stuck using the same paradigms for distribution and deployment that we have used since World War II. Clearly, times have changed, and so should our air mobility system.

### **Recommendation: Allow AMC to Operate Theater Airlift**

A fairly radical change to the traditional and fundamental view of theater logistics is to allow Air Mobility Command to command and control all theater airlift forces. This seems to fly in the face of traditional paradigms, where support of the theater commander has led to the conclusion that they must operate their own miniature airlift system.

However, this new type of arrangement could offer some distinct advantages. First, we must recognize that two different airlift operations will automatically generate inefficiencies. Second, modern airlift aircraft are now able to both operate between major theaters with great speed, and also can utilize shorter airfields. This is true of both

the C-17, as well as the C-130J, whose increased range will allow it to operate between major theaters far more easily than its predecessors. Finally, modern information technology would allow AMC to use its existing, extremely robust command and control center, and easily manage the entire airlift flow.

The theater Air Mobility Division or AMOCC simply does not have the resources to manage a global supply chain. During recent conflicts, the AMD for US Central Command set up a basic channel structure, based on frequency only, without regard to cargo requirements. Because of limited manning and difficulty gaining insight on cargo arriving from outside the theater, only this rudimentary system could be built. The result was many theater airlift missions operating empty, or at least carrying minimal cargo, into high-threat airfields. A centralized management of airlift would prevent such wasted capacity.

Furthermore, modern information technology and communications would allow such an arrangement to work with little impact on the theater. Since airlift allocation can still be performed at the JTB, maintaining OPCON over traditional theater airlift does not mean the theater will not have airlift when required. In fact, there is a high probability the airlift support to the theater can be increased because of additional capacity available to the TACC planners.

#### Recommendation: Realign Air Refueling Forces in JAOC

Although air refueling and airlift have been combined in Air Mobility Command, that does not imply that they are employed identically during wartime. Air refueling forces play a key role in deploying and sustaining combat forces, and are an essential part of air mobility. However, once deployed themselves, air refueling aircraft require much more

integration with the receivers they support. Combat air planners depend heavily on tankers to employ combat force. Without tanker support, most strike missions could not be flown. The same could be said for airlift, but only indirectly. It may be true that a combat mission could not fly because cargo did not arrive in time to support it. But that cargo delivery is not time sensitive, and could arrive any amount of time in advance. On the other hand, air refueling must occur simultaneously with combat missions.

Therefore, it is essential that air refueling planners participate fully in Air Tasking Order development. This requires tanker planners to work in the Strategy, Combat Plans, and Combat Operations divisions of the JAOC. Only then can they effectively support and sustain combat aircraft dependent on air refueling.

#### Recommendation: Reconsider Role of DIRMOBFOR

The role of the DIRMOBFOR is not simple. He or she must carefully coordinate between multiple different staffs to ensure air mobility forces effectively support the Joint Task Force commander. Having multiple, cross-functional duties makes it very difficult to understand the scope of the DIRMOBFOR's responsibilities. In addition, the DIRMOBFOR is sometimes in an ambiguous position between AMC-owned forces, and those CHOPped to the theater. Authority for waivers to operational procedures may or may not be within their purview, depending on who has true command authority.

If the theater airlift mission is transferred to AMC, the role of the DIRMOBFOR can be clarified. The DIRMOBFOR would then come under the OPCON of AMC/TACC, but with a "close support" relationship setup between AMC and the combatant commander. This would allow the maximum flexibility and concentration of effort for air mobility forces supporting a combatant commander, along with a senior, air mobility officer

assigned to work closely with the JFACC. This arrangement would eliminate much of the ambiguity surrounding the DIRMOBFOR's role, while still offering outstanding air mobility support. The idea of a "TACC Forward" is one possible paradigm, where the DIRMOBFOR serves as the on-scene director for air mobility efforts during a contingency. The AMD itself could remain under the operational control of TACC, thus leveraging existing command and control capabilities. All of this is heavily dependent on whatever changes are made to command and control arrangements, either via reengineering or transformation. The bottom line is the DIRMOBFOR has an important role to play in ensuring the success of air mobility efforts in times of crisis, and their role must be reviewed to remain effective.

#### Recommendation: Develop Wartime Air Mobility Processes

Although air mobility forces have a real-world mission during peacetime, we must recognize that peacetime processes do not always work the same way during contingencies. The movement priority system, which works very well in peacetime, fails to provide sufficient fidelity during major conflicts. When most of what moves by air is in support of a contingency, there must be a way of further distinguishing which wartime support missions are most important at any given time. Also, the peacetime rules for billing users of air mobility need to be reviewed for contingency use. Wartime demands additional flexibility, and is usually accompanied by increased available funding from Congress in support of the conflict. We should develop a wartime pricing process that can take advantage of this situation.

In addition, we must consider the way air mobility forces are provided to theater commanders in times of crisis. Historically, we have CHOPped large numbers of theater

airlift and air refueling forces, without apparent regard for their potential employment. If AMC is to retain the theater airlift mission, the need to CHOP tactical airlift forces will go away, with the exception of forces required for airdrop missions. The extensive coordination necessary for airdrop missions requires their inclusion into the air tasking cycle, and this direct involvement in combat air operations justifies a CHOP to the theater commander. On the other hand, not every air refueling mission in support of combat requires a CHOP. In the case of long-range bomber missions, many tanker sorties well outside the combat area of operations are necessary. It does not follow, however, that all of these missions must fall under the operational control of a theater commander. AMC can provide these missions, by setting up a tactical control (TACON) relationship for tanker aircraft to be controlled by the theater air operations center for the duration of a single mission. This would allow AMC to use the tanker in support of other worldwide missions, rather than limiting it to support of a single theater for an indefinite period. Finally, positioning air mobility planners in the AOC must be reconsidered. Tanker planners in particular need to be fully integrated into the air tasking cycle. This means assigning tanker planners, and when necessary airdrop planners, to Combat Plans and Combat Operations, and not the AMD.

#### The Reengineering Team

One important note needs to be added, by way of conclusion. Although I have endeavored to demonstrate what reengineering could do to improve air mobility, in fact much more needs to be done than one man's analysis. Reengineering itself is normally performed in a group context, and requires direction from the highest levels of a

company, along with resources, and “buy-in” at all levels. Here I will recommend who should fill these roles, and try to highlight what more needs to be done.

First, the Leader: “a senior executive who authorizes and motivates the overall reengineering effort.” In the case of Air Mobility, the Leader would most likely need to be the Secretary of Defense. The Secretary as Leader has enough clout to cause the organization to accept the radical disruptions that reengineering inevitably brings. The good news is formal efforts towards transformation of the military are underway already.

Second, the Process owner: “a manager with responsibility for a specific process and the reengineering effort focused on it.” The Commander of Air Mobility Command should fill this role. They have overall responsibility, by directive, for our country’s air mobility mission. The commander will be responsible for ensuring the reengineering gets accomplished, by acquiring resources, and motivating the entire process.

Third, the Reengineering Team: “a group of individuals dedicated to the reengineering of a particular process, who diagnose the existing process and oversee its redesign and implementation.” Experts from across AMC, from airlift, air refueling, and air mobility support, will have to be brought in to form this team. Selected squadron commanders from these areas would be my recommendation for forming this group.

Fourth, the Steering Committee: “a policy-making body of senior managers who develop the organization’s overall reengineering strategy and monitor its progress.” Probably commanders at the wing level, plus key AMC staff directors need to engage air mobility reengineering at this level. As reengineering solutions are developed, they would have sufficient clout to maintain the efforts and make strides towards their implementation.

Finally, the Reengineering Czar: “an individual responsible for developing reengineering techniques and tools within the company and for achieving synergy across the company’s separate reengineering projects.” There are a number of areas from which a czar could be chosen. The Air Force Experimentation Office, operating in support of the Office of Force Transformation, could be one possible resource. Also, the Business Process Reengineering office under the Assistant Secretary of Defense for C3I could have the required expertise. Finally, as many large corporations have undergone reengineering, a czar could be contracted by the Air Force instead of finding one in house.

It is my hope that this sort and scale of effort can be brought to bear in the hopes of transforming our air mobility system. Business Process Reengineering offers a great opportunity for transforming our air mobility system in order for us to maintain this critical, national asset.

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## **Vita**

Major David T. DuHadway was born in Norfolk, Virginia on 19 May 1967. He graduated from Lake Braddock Secondary School, Burke, Virginia in 1985, and attended the University of Notre Dame, Notre Dame, Indiana. He graduated with a Bachelor of Science in Electrical Engineering, and was commissioned through the Air Force Reserve Officer Training Corps in May of 1989.

He subsequently attended Undergraduate Pilot Training at Vance Air Force Base, Oklahoma, receiving his pilot wings in February of 1991. His first assignment was as a T-38A “Talon” Instructor Pilot at Vance, where he went on to hold many positions throughout the 71<sup>st</sup> Flying Training Wing, including Runway Supervisory Unit Controller, Wing Scheduler, and Squadron Check Pilot. In 1996 he was assigned to the Electronic Systems Center, as liaison to the Defense Information Systems Agency (DISA) in Sterling, Virginia. In 1998 he volunteered for duty flying the RQ-1A “Predator” Unmanned Aerial Vehicle (UAV), at Nellis Air Force Base, Nevada. He served as Flight Commander, Evaluator Pilot, and Operations Officer during Operation ALLIED FORCE in Tuzla, Bosnia. He served as RQ-1A Wing Standardization and Evaluation Pilot for the 57<sup>th</sup> Operations Group. Major DuHadway then completed a Master of Engineering degree in Computer Engineering from the University of Idaho. Major DuHadway went on to fly the C-141B “Starlifter” in 2000, with the 4<sup>th</sup> Airlift Squadron, McChord Air Force Base, Washington. He was an Instructor Pilot as well as Chief of Airland Plans for the 62<sup>nd</sup> Airlift Wing. In 2002 he was selected for the Advanced Study of Air Mobility program, at the Air Mobility Warfare Center, Fort Dix, New Jersey.

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<b>14. ABSTRACT</b> The nature of any successful business, government, or military, is to be able to deal with change effectively. Change can come about as a result of societal or technological progress, or as an application of past experience. Given that change will, at some point, always be required, the question of how best to accomplish these changes needs to be addressed. Small-scale change is relatively easy to achieve, but change in large degree requires a more radical approach. Business Process Reengineering is a relatively recent and very successful methodology for dealing with large-scale changes. Our nation's military, even though it is considered by most as the best in the world, must continue to change, to transform itself, if it hopes to maintain that advantage. One important and clearly distinctive capability is our burgeoning air mobility fleet of airlift and air refueling aircraft. Changes in technology and lessons learned from recent operations highlight the need for us to review our use of air mobility assets. This research paper will explore various air mobility business processes, identify those becoming obsolete, and recommend possible solutions and updated methodology by incorporating reengineering techniques.					
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